INDEX OF UNDERGROUND-ENVIRONMENT DUST REPORTS: CANMET MINING RESEARCH LABORATORIES, 1960-1985

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INDEX OF UNDERGROUND-ENVIRONMENT DUST REPORTS: CANMET/MINING RESEARCH LABORATORIES, 1960-1985

M.G. Grenier* and K.C. Butler**

Abstract

This is a selected list of 123 reports prepared by the staff of the Mining Research Laboratory on the subject of underground environmental dust. The reports chosen, which span an interval of 25 years, are listed chronologically in each of the five categories. These categories include instrument design and calibration, results of underground dust surveys, and dust measurement techniques.

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LISTE DE RAPPORTS SUR LA POUSSIÈRE EN MILIEU SOUTERRAIN: CANMET/LABORATOIRES DE RECHERCHE MINIÈRE, 1960-1985

M.G. Grenier* et K.C. Butler**

Résumé

La présente liste de 123 rapports traitant de la poussière en milieu souterrain a été dressée par le personnel des Laboratoires de recherche minière. Ces rapports couvrent une période de 25 ans et sont présentés en ordre chronologique à l'intérieur de cinq catégories. Ces catégories comprennent, entre autres, la conception et l'étalonnage d'instruments, les résultats d'études portant sur la poussière en milieu souterrain et les méthodes de mesure de la poussière.

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INTRODUCTION

The reports listed here are those that could be categorized in one of the following sections:

- instrument calibration and design;
- X-ray diffraction technology for quartz dust assessment;
- results of underground dust surveys;
- dust measurement techniques and methods;
- dust control underground.

Reports written in this time period that could not be categorized in the above sections were not included. A report* by M. Grenier and J. Bigu reviews the research work performed between 1960 and 1985.

*M. Grenier and J. Bigu. "Past, present and future of dust research at the Elliot Lake Laboratory"; *Division Report* M&ET/MRL 86-2(TR); CANMET, Energy, Mines and Resources Canada; December 1985.

INTRODUCTION

Les rapports contenus dans la présente liste peuvent être classés dans un des domaines suivants:

- étalonnage et conception d'instruments;
- méthode de la diffraction des rayons X pour l'identification de la poussière de quartz;
- résultats d'études portant sur la poussière en milieu souterrain;
- méthodes de mesure de la poussière;
- contrôle de la poussière en milieu souterrain.

Les rapports rédigés au cours de cette période qui n'appartiennent pas à un de ces domaines ne sont pas inclus dans cette liste. M. Grenier et J. Bigu ont préparé un rapport* sur les travaux entrepris entre 1960 et 1985.

*M. Grenier et J. Bigu. "Past, present and future of dust research at the Elliot Lake Laboratory"; *Rapport de division* M&ET/MRL 86-2(TR); CANMET, Énergie, Mines et Ressources Canada; décembre 1985.

CATEGORY 1 – INSTRUMENT CALIBRATION AND DESIGN
CATÉGORIE 1 – ÉTALONNAGE ET CONCEPTION D'INSTRUMENTS

1. Cochrane, T.S., and Casey, F.L. "A review of dust standards and dust sampling equipment in the mining industry"; FMP-60/19-MIN; August 1961.

2. Richards, L. "Construction details of the dust chamber and dust feed mechanism"; FMP-63/167-MIN; November 1963.

3. Richards, L. "Maintenance and repair of midget impinger pump, tests of vacuum gauge on pump and calibration of impinger nozzles"; FMP-63/168-MIN; November 1963.

4. Richards, L. "Laboratory preparation of dust samples for particle sizing and counting with the microprojector"; FMP-63/169-MIN; November 1963.

5. Cochrane, T.S., and Richards, L. "A laboratory comparison of the tyndalloscope, midget impinger and electrostatic methods of evaluating airborne dust concentrations"; FMP-65/118-MRL; August 1965.

6. Stefanich, W., and Tervo, R.C. "The development and application of an atomizer for the production of dust clouds with aggregated particles"; MR-67/72-ID; November 1967.

7. Knight, G. "A laboratory comparison of dust sampling instruments on ore, concentrate and flux from a Quebec smelter operation"; FMP-66/134-MRL; July 1966.

8. Knight, G. "Comparison of dust sampling instruments - I: Interim report on pure silica dust"; FMP-66/70-MRL; April 1966.

9. Knight, G. "Comparison of dust sampling instruments - II: Interim report on pyrite dust"; FMP-66/144-MRL; August 1966.

10. Knight, G. "Comparison of dust sampling instruments - III: Interim report on coal dust"; FMP-66/147-MRL; August 1966.

11. Knight, G.; Rajhans, G.S.; and Stefanich, W. "Comparison of dust sampling instruments - IV: Interim report on mica dust"; FMP-67/6-MRL; December 1966.

12. Knight, G.; Rajhans, G.S.; and Stefanich, W. "Comparison of dust sampling instruments - V: Interim report on asbestos and glass fibre dust"; MR-67/40-ID; May 1967.

13. Knight, G.; Rajhans, G.S.; and Stefanich, W. "Comparison of dust sampling instruments - VI: Interim report on coal, silica, pyrite and mica dust clouds dispersed in a jet mill and repeat experiments"; MR-67/71-ID; November 1967.

14. Knight, G. "Comparison of dust sampling instruments - VIII: Interim report on statistical analysis technique"; MR-68/110-ID; April 1969.

15. Stefanich, W. "Comparison of dust sampling instruments - IX: Comparison of microscope counting techniques"; MR-67/73-ID; November 1967.

16. Knight, G. "Comparison of dust sampling instruments - X: Analysis of results on non-aggregated dusts"; MR-68/11-ID; January 1968.

17. Knight, G., and Stefanich, W. "Comparison of dust sampling instruments - XI: Report on dust clouds of aggregated particles"; MR-68/33-ID; March 1968.

18. Lichti, K. "Comparison of dust sampling instruments - XII: Collection efficiency with spheres"; MR-68/53-ID; April 1968.

19. Knight, G. "Comparison of dust sampling instruments - XIII: Analysis of those assessing dust by number"; MR-69/49-ID; April 1969.

20. Knight, G. "Comparison of dust sampling instruments - XIV: Relationships between respirable mass, mean number and light scatter"; MR-69/51-ID; June 1969.

21. Knight, G. "Comparison of dust sampling instruments - XVI: Recalibration of the McIntyre Research Foundation aluminum-dust sampler"; MR-69/3-LD; December 1968.

22. Knight, G., and Stefanich, W. "Laboratory dust chamber - II: Dust cloud preparation"; MR-67/41-ID; August 1967.

23. Knight, G., and Stefanich, W. "Laboratory dust chamber - III: Installation and operation of dust sampling instruments"; MR-68/22-ID; December 1967.

24. Knight, G. "Laboratory dust chamber - IV: The particle size and shape characteristics of the standard dust clouds"; MR-68/34-ID; March 1968.

25. Knight, G., and Lichti, K. "Comparison of cyclone and horizontal elutriator size selectors"; MR-69/13-ID; March 1969.

26. Knight, G., and Kowalchuk, R. "Calibration of the modified McIntyre Research Foundation filter paper sampler, a smoke meter and two gravimetric samplers for aluminum prophylactic dust"; MR-70/114-ID; November 1970.

27. Cochrane, T.S.; Knight, G.; Richards, L.C.; and Stefanich, W. "Comparison of dust sampling instruments"; *CANMET Research Report* R250; October 1971.

28. Knight, G. "Personal respirable dust samplers: Test on MSA prototype 1972"; *Internal Report* 73-22; February 1973.

29. Knight, G. "Respirable dust samplers: Tentative specifications and test methods"; *Internal Report* 73-23; February 1973.

30. Knight, G., and Schrag, K.R. "Personal respirable dust samplers: Calibration of Alberta Dept. of Health and Social Development dust samplers"; *Internal Report* 73-42; February 1973.

31. Tchir, W.J. "Respirable dust sampling: Tests and modifications to Casella Type 113A"; *Internal Report* 73-65; April 1973.

32. Knight, G. and Stefanich, W., "Personal respirable dust samplers: Pulsation dampers"; *Internal Report* 73-69; May 1973.

33. Stewart, B. "Collection characteristics of the two-stage respirable size selector (CAMPEDS Mark 2)"; MRP/MRL 75-48(TR); April 1975.

34. Knight, G., and Stewart, B. "The lower limit of the Coulter size analyzer"; MRP/MRL 75-93(TR); September 1975.

35. Knight, G. "Calibration of respirable fraction sampling equipment and quartz analysis of airborne dust samples"; MRP/MRL 76-95(OP); June 1976.

36. Knight, G.; Washington, R.A.; and Gray, W.M. "A combined personal sampler for dust and radon-daughter exposure in mines"; MRP/MRL 76-122(OP); September 1976.

37. Knight, G., and Kowalchuk, R. "A comparison of gravimetric dust samplers underground"; MRP/MRL 77-40(TR); March 1977.

38. Knight, G.; Thompson, E.; and Treaftis, H.N. "Collection characteristics of the respirable dust size selectors used at Elliot Lake"; MRP/MRL 77-72(TR); June 1977.

39. Chmara, P., and Knight, G. "A comparison of konimetry and gravimetric dust samplers"; MRP/MRL 78-94(TR); 1978.

40. Rowlandson, M. "Mass collection efficiency tests on cyclones"; MRP/MRL 79-26(TR); March 1979.

41. Kirk, B. "An iris diaphragm based interface for use in eriometry"; *CANMET Report* 80-20E; February 1980.

42. Kirk, B. "Development of an asbestos sampling head - Progress report"; MRP/MRL 80-109(TR); October 1980.

43. Kirk, B. "Determining size distributions by sedimentation and eriometry"; MRP/MRL 80-110(J); September 1980.

44. Knight, G., and Dainty, D. "Continuous dust sensors: Proposed test methods"; MRP/MRL 83-11(TR); December 1982.

45. Hardcastle, S. "Dust concentrations as a function of air velocity in mines - Application of continuous dust sensors and an aerosol counter"; MRP/MRL 84-72(TR); May 1984.

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47. Knight, G., and Moore, E. "Comparison of dust samplers: Statistical analysis techniques"; MRP/MRL 84-79(OP,J); February 1984.

48. Knight, G. "A dust sampling and assessment system - CAMPEDS for use in hard rock mines"; MRP/MRL 84-113(J); March 1984.

49. Hardcastle, S. "Comparison of prototype diesel/mineral monitors against a Simslin II"; MRP/MRL 85-26(TR); February 1985.

CATEGORY 2 – X-RAY DIFFRACTION TECHNOLOGY FOR QUARTZ DUST ASSESSMENT

CATÉGORIE 2 – MÉTHODE DE LA DIFFRACTION DES RAYONS X POUR L'IDENTIFICATION DE LA POUSSIÈRE DE QUARTZ

1. Gillieson, A.H., and Farrell, D.M. "The determination of quartz in dusts by infrared spectroscopy"; *Mines Branch Investigation Report* IR 69-63; 1969.

2. Machacek, H. "Quantitative X-Ray Determination of Quartz and Pyrite in Dusts"; *Technical Bulletin* TB-123; 1970.

3. Ireland, G. "Calibration of X-ray diffraction equipment with Casella personal samplers: A dust measuring system"; MR-70/121-ID; December 1970.

4. Knight, G.; Stefanich, W.; and Ireland, G. "Laboratory calibration of a technique for determination of respirable quartz in mine air using personal samplers and X-ray diffraction"; MR-71/33-ID; June 1971.

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6. Knight, G. "Determination of respirable quartz in mine air using personal samplers and X-ray diffraction"; MR-71/78-ID; July 1971.

7. Knight, G.; Stefanich, W.; and Ireland, G. "Analysis of quartz in airborne dust by X-ray diffraction: Part II - Subsidiary studies"; *Internal Report* 72-41; March 1972.

8. Knight, G., and Stefanich, W. "Analysis of airborne dust by X-ray diffraction: Preparation and calibration of non-quartz mineral standards"; *Internal Report* 72-141; November 1972.

9. Knight, G. "Discussion on quartz analysis held in Cincinnati December 6-7, 1972"; *Internal Report* 72-156; December 1972.

10. Knight, G.; Kowalchuk, R.; and Yourt, R. "Development of a dust sampling system for hardrock mines based on gravimetric and quartz (by X-ray diffraction) assessment"; *Internal Report* 73-52; July 1973.

11. Knight, G., and Cochrane, T.S. "Gravimetric dust sampling with quartz analysis and its use in metal and mineral mines"; *Division Report* 74-131; November 1974.

12. Sekera, P. "Absorption effects in X-ray analysis"; MRP/MRL 76-17(TR); January 1975.

13. Gammie, K. "Calibrations of standards for assessment of respirable quartz using X-ray diffraction"; MRP/MRL 76-87(TR); June 1976.

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18. Knight, G. "The use of an on-line computer to control quantitative XRD analysis"; MRP/MRL 80-101(OP,J); August 1980.

19. Knight, G. "Elliot Lake laboratory procedure for analysis of free silica using X-ray diffraction"; MRP/MRL 81-4(TR); December 1980.

20. Knight, G. "Proposed dust sampling system for miners based on a portable X-ray diffractometer - A discussion paper"; MRP/MRL 83-54(TR); June 1983.

CATEGORY 3 – RESULTS OF UNDERGROUND DUST SURVEYS

CATÉGORIE 3 – RÉSULTATS D'ÉTUDES PORTANT SUR LA POUSSIÈRE EN MILIEU SOUTERRAIN

1. Stefanich, W., and Knight, G. "Respirable dust survey in no. 26 colliery, Cape Breton, Nova Scotia, October 1970"; MR-70/113-ID; November 1970.

2. Knight, G. "Quartz analysis of airborne dust samples from Alberta coal mines"; *Internal Report* 73-109; July 1973.

3. Knight, G., and Washington, R.A. "Dust production in mines: First survey in a mine with a high quartz content in the ore"; *Internal Report* 74-41; February 1974.

4. Knight, G. "Survey of dust production in mineral preparation"; *Division Report* 74-77; June 1974.

5. Knight, G. "Dust survey at a highly mechanized open stoping operation"; *Division Report* 74-125; October 1974.

6. Knight, G. "Dust survey at a mine using cut and fill"; *Division Report* 74-127; November 1974.

7. Knight, G. "Dust survey at a second highly mechanized open stoping operation"; MRP/MRL 75-92; September 1975.

8. Knight, G. "Comparisons between airborne dusts from crushing operations"; MRP/MRL 75-98(TR); September 1975.

9. Knight, G. "Dust production in LHD operations: Effect of water on the loading cycle"; MRP/MRL 77-18(TR); July 1976.

10. Knight, G.; Kirk, B.; and Stefanich, W. "Dust production in LHD operations - The effect of water in a highly siliceous ore"; MRP/MRL 77-21(TR); January 1977.

11. Bigu, J.; Gangal, M.; Knight, G.; Regan, R.; and Stefanich, W. "Radiation, ventilation and dust studies at Denison Mines"; MRP/MRL 80-114(TR); July 1980.

12. Knight, G.; Bigu, J.; Mogan, P.; and Steward, D.B. "The size distribution of airborne dust in mines"; MRP/MRL 81-115(OP,J); August 1981.

13. Knight, G. "Labrador mixed dust pneumoconiosis study - Quartz analysis"; MRP/MRL 82-52(J); April 1982.

14. Bigu, J.; Gangal, M.; and Knight, G. "Studies of radiation, ventilation and dust in an underground uranium mine in the Elliot Lake area"; MRP/MRL 82-58(J); May 1982.

15. Knight, G. "Inter-laboratory crosscheck of quartz analyses on mine airborne dust samples"; MRP/MRL 83-85(OP,J); August 1982.

16. Knight, G.; Moore, E.; and Smith, C.W. "Size distribution of airborne dust in Labrador iron mines"; MRP/MRL 84-112(OP,J); October 1984.

17. Knight, G. "Rationale for interpretation of airborne dust measurements at Copper Cliff sinter plant 1948-1963"; MRP/MRL 84-109(TR); October 1984.

CATEGORY 4 – DUST MEASUREMENT TECHNIQUES/METHODS
CATÉGORIE 4 – MÉTHODES DE MESURE DE LA POUSSIÈRE

1. Knight, G. "Size selective sampling"; MR-70/10-ID; January 1970.

2. Knight, G., and Kowalchuk, R. "Testing of respirable dust sampling techniques for use in Ontario mines: Part I - Description of techniques"; MR-71/16-ID; January 1971.

3. Kowalchuk, R. "Testing of respirable dust sampling techniques for use in Ontario mines: Part II - Elliot Lake detailed dust measurements"; MR-71/44-ID; February 1971.

4. Knight, G., and Kowalchuk, R. "Testing of respirable dust sampling techniques for use in Ontario mines: Part VII - Instrument mechanical performance"; *Internal Report* 72-99; August 1972.

5. Knight, G., and Kowalchuk, R. "Testing of respirable dust sampling techniques for use in Ontario mines: Part VI - Analysis of personal sampling program"; *Internal Report* 72-103; August 1972.

6. Knight, G. "Guide to gravimetric sampling with quartz analysis in mines"; *Division Report* 74-96; December 1974.

7. Kirk, B. "Error analysis of gravimetric and X-ray diffraction assessment of respirable dust"; MRP/MRL 75-78(TR); August 1975.

8. Knight, G.; Kirk, B.; Sutarno, R.; and Stefanich, W. "Personal dust sampling in mines: Statistical analysis"; MRP/MRL 79-14(OP,J); January 1979.

9. Knight, G. "A comparison between two mine dust sampling systems"; MRP/MRL 79-87(TR); September 1979.

10. Knight, G. "Personal dust sampling for asbestos: A position paper"; MRP/MRL 79-88(OP); November 1979.

11. Knight, G. "Novel methods for measuring asbestos fibre: A position paper"; MRP/MRL 79-89(OP); November 1979.

12. Knight, G. "Program for dust in coal mines"; MRP/MRL 80-1(TR); January 1980.

13. Knight, G., and Stefanich, W. "The use of impactors for dust size distribution analysis in mines"; MRP/MRL 80-34(TR); September 1979.

14. Kirk, B. "A newly designed automatic sieving system"; MRP/MRL 80-74(OP); June 1980.

15. Cunningham, G.A. "Reproducibility of eriometric size analysis"; MRP/MRL 80-123(TR); December 1980.

16. Knight, G., and Kirk, B. "Comparison of respirable dust specifications with recent lung data"; MRP/MRL 81-7(J); December 1980.

17. Kirk, B. "Eriometry as a dust measurement technique for use in underground mines"; MRP/MRL 81-23(OP); February 1981.

18. Knight, G., and Kirk, B. "Suggested gravimetric personal dust sampling protocol for calculation of exposure"; MRP/MRL 81-69(TR); July 1980.

19. Knight, G. "Sampling and analysis of silica in airborne dusts"; MRP/MRL 82-73(OP); July 1982.

20. Knight, G. "Respirable dust sampling for fibre particle combinations in some asbestos industries"; MRP/MRL 82-74(OP); July 1982.

21. Knight, G. "Rock fibre in non-asbestos mines - A suggested program for Canadian mines"; MRP/MRL 83-9(J); January 1983.

22. Knight, G., and Dainty, D. "Continuous dust sensors: Proposed test methods"; MRP/MRL 83-11(TR); December 1982.

23. Bardswich, W.; Campbell, W.J.; Knight, G.; and Moore, E. "Workplace respirable dust monitoring - Current and proposed Canadian practice"; MRP/MRL 84-39(OP,J); August 1983.

24. Knight, G. "Proposal for particle size fraction definitions for health related sampling"; MRP/MRL 84-67(J); March 1984.

25. Knight, G. "Rationale for interpretation of airborne dust measurements at Copper Cliff sinter plant 1948-1963"; MRP/MRL 84-109(TR); October 1984.

26. Knight, G. "The use of rapid reading airborne dust instruments in mines and mills"; MRP/MRL 85-21(TR); February 1985.

27. Knight, G. "A rationale for size selective dust sampling definitions and design"; MRP/MRL 85-49(OP,J); October 1984.

CATEGORY 5 – DUST CONTROL UNDERGROUND

CATÉGORIE 5 –CONTRÔLE DE LA POUSSIÈRE EN MILIEU SOUTERRAIN

1. Diegel, J.G. "Testing the efficiency of commercially available filters for mine air filtration"; MR-70/82-ID; August 1970.

2. Knight, G. "Dust production and control in mines"; *CANMET Report* 80-27E; 1980.

3. Knight, G. "Dust measurement and control in conveyor roadways: 1 - Proposal for a research program as a basis for discussion"; MRP/MRL 84-7(TR); January 1984.

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5. Knight, G. "Airborne dust control for hard rock mines - Position paper and an outline for research and development 1985-1992"; MRP/MRL 85-7 (INT); November 1984.